

CLAIMS

What is claimed is:

5 1. A composition comprising a porous substrate impregnated with a permanganate, wherein the permanganate is a permanganate salt having a solubility in water greater than that of potassium permanganate, wherein the concentration of permanganate salt in the composition is at least approximately 8% permanganate salt by weight.

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2. The composition of claim 1, wherein the permanganate salt is selected from the group consisting of sodium permanganate, magnesium permanganate, calcium permanganate, barium permanganate, lithium permanganate, or a combination thereof.

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3. The composition of claim 1, wherein the composition comprises at least about 13 to about 25% permanganate salt by weight.

20 4. The composition of claim 1, wherein the composition comprises at least about 15 to about 20 % permanganate salt by weight.

5. The composition of claim 1, wherein the composition comprises at least about 18 to about 19% permanganate salt by weight.

25 6. The composition of claim 1, wherein the composition further comprises at least about 5% and about 25% water by weight.

7. The composition of claim 1, wherein the permanganate salt comprises sodium permanganate.

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8. The composition of claim 1, further comprising a gas evolving material selected from a carbonate compound, a bicarbonate compound, or a combination thereof.

5 9. The composition of claim 1, wherein the porous substrate comprises activated alumina, a silica gel, a zeolite, a zeolite-like mineral, kaolin, an adsorbent clay, activated bauxite, or a combination thereof, and wherein the porous substrate is between about 40 and about 80% by weight of the composition.

10 10. The composition of claim 9, wherein the zeolite or zeolite-like mineral is selected from amicite, analcime, pollucite, boggsite, chabazite, edingtonite, faujasite, ferrierite, gobbinsite, harmotome, phillipsite, clinoptilolite, mordenite, mesolite, natrolite, garronite, perrialite, barrerite, stilbite, thomsonite, kehoeite, pahasapaite, tiptopite, hsianghualite, lovdarite, viseite, partheite, prehnite, roggianite, 15 apophyllite, gyrolite, maricopaite, okenite, tacharanite, tobermorite, or a combination thereof.

11. The composition of claim 8, wherein the gas-evolving material comprises sodium bicarbonate and the porous substrate comprises activated alumina 20 or a combination of activated alumina and at least one zeolite or zeolite-like mineral.

12. The composition of claim 11, wherein the concentration of sodium bicarbonate is between about 5 and about 25% by weight of the composition.

25 13. A method of treating a contaminated fluid stream comprising contacting the contaminated fluid stream with a solid filtration composition such that contaminants are removed from the fluid stream, wherein the solid filtration composition comprises a porous substrate impregnated with a permanganate, wherein the permanganate is a permanganate salt having a solubility in water greater than that

of potassium permanganate, wherein the concentration of permanganate salt in the composition is at least approximately 8% permanganate salt by weight.

14. The method of claim 13, wherein the concentration of permanganate is
5 between about 13 and about 25% by weight of the composition.

15. The method of claim 13, wherein the concentration of permanganate is
between about 15 and about 20% by weight of the composition.

10 16. The method of claim 13, wherein the concentration of permanganate is
between about 18 and about 19% by weight of the composition.

15 17. The method of claim 13, wherein the composition further comprises a
gas-evolving material having a concentration between about 5 and about 25% by
weight of the composition.

18. The method of Claim 13, wherein the contaminated fluid stream
contains hydrogen sulfide and the removal capacity of the solid filtration unit is at
least about 16%

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19. The method of Claim 13, wherein the contaminated fluid stream
contains ethylene and the removal capacity of the solid filtration unit is at least about
4%

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20. The method of Claim 13, wherein the contaminated fluid stream
contains formaldehyde and the removal capacity of the solid filtration unit is at least
about 4%

21. The method of Claim 13, wherein the contaminated fluid stream contains methyl mercaptan and the removal capacity of the solid filtration unit is at least about 6%

5 22. A method of preparing a solid filtration composition comprising:

a) mixing a permanganate and a porous substrate, wherein the permanganate is a permanganate salt having a solubility in water greater than that of potassium permanganate;

b) spraying the mixture with water;

10 c) forming the mixture into at least one cohesive porous unit; and

d) curing the unit at a temperature of from about 100°F to about 200°F until the concentration of water is at least about 5% by weight of composition, and the concentration of permanganate is at least about 8% by weight of composition.

15 23. The method of claim 22, wherein the unit is cured until the concentration of permanganate is between about 13 and about 25% by weight of the composition.

20 24. The method of claim 22, wherein the unit is cured until the concentration of permanganate is between about 15 and about 20% by weight of the composition.

25 25. The method of claim 22, wherein the unit is cured until the concentration of permanganate is between about 18 and 19% by weight of the composition.

26. The method of claim 22, wherein the unit is cured until the water concentration is between about 5% and about 25%.

27. The method of claim 22, wherein the porous substrate comprises activated alumina, a silica gel, a zeolite, a zeolite-like mineral, kaolin, an adsorbent clay, activated bauxite, or a combination thereof.

5 28. The method of claim 22, further comprising mixing the permanganate and porous substrate with a gas-evolving material, wherein the gas-evolving material is selected from a carbonate compound, a bicarbonate compound, or a combination thereof.

10 29. The method of claim 22, further comprising a gas-evolving material, wherein the concentration of gas-evolving material is between about 5 and about 25% by weight of the composition.

15 30. The method of claim 22, wherein the gas-evolving material is sodium bicarbonate and the porous substrate is activated alumina or a combination of activated alumina and at least one zeolite or zeolite-like mineral.

20 31. The method of claim 30, wherein the zeolite or zeolite-like mineral is selected from amicite, analcime, pollucite, boggsite, chabazite, edingtonite, faujasite, ferrierite, gobbinsite, harmotome, phillipsite, clinoptilolite, mordenite, mesolite, natrolite, garronite, perrialite, barrerite, stilbite, thomsonite, kehoeite, pahasapaite, tiptopite, hsianghualite, lovdarite, viseite, partheite, prehnite, roggianite, apophyllite, gyrolite, maricopaite, okenite, tacharanite, tobermorite, or a combination thereof.

25 32. The method of claim 22, wherein the concentration of the porous substrate comprises between about 40% and about 60%.

33. The composition of claim 1, wherein the solubility of the permanganate salt is greater than 6.5g/100 ml in weight, at 20°C.